Haralson County High School
1655 Georgia Highway 120
Tallapossa, GA 30176

Mr. Brett Stanton, Superintendent
Phone: 770-574-2500 Ext 233
Email: brett.stanton@haralson.k12.ga.us

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Submitted To:
Regina Brown, Telecommunications Access Policy Division

Address:
Wireline Competition Bureau-FCC
445 12th Street S.W. Room 5-A360
Washington, D.C. 20554
E-Mail: EDU2011pilot@fcc.gov

Introduction:

In 2010 the Haralson County High School (HCHS) received two grants that would prove to have huge impact on the culture of both the high school and the school district. The first of these grants was a blended learning grant which was funded primarily through the state of Georgia and provided each student with a netbook which could be used at the school for access to all of the electronic resources that the school district had to offer. Along with the hardware each teacher in the school received extensive training in the area of technology integration in the classroom. The three tools that received the most attention were Moodle, an open source learning management system; and Google Apps, a free email and document sharing system; and classroom smart boards, an interactive presentation system. An assessment system was also developed which was used to assess the teachers' integration of technology into the classroom and the impact that it was having on student learning.

Along with the blended learning grant HCHS also received an ED2011 grant which provided wireless, broadband access to the students when outside of school. This service was provided by a national cellular carrier which has a significant presence in the area. This grant is the focus of this report but the narrative presented here will be interwoven with the blended learning grant as the two initiatives together the importance of provided both the end user device

along with a robust infrastructure to support the devices. In this connected world just providing computing devices for students is necessary but not sufficient if they are to receive the type of instruction necessary for their success in the 21st century. Students must have the ability to be connected 24/7 and for many rural and impoverished districts such as Haralson County simply expecting students to have internet access at home is not realistic. Something more has to be done to ensure that all of the students of the district have unfettered access to the electronic resources that they need to be successful in the 21st century.

Project Benefits:

During the first year of the project the Haralson County School System provided netbook mobile learning devices to each student at the Haralson County High School for use during the academic year. Along with the devices teachers received training from the Northwest Georgia ETC (a state agency charged with helping integrate technology into teaching) to help them create blended learning opportunities for their students. Many of these opportunities focused on the use of Moodle. Moodle is an open source learning management system that allows students and teachers to access course content 24/7 from any location. In order to facilitate the use of Moodle the EDU2011 grant was combined with the Blended Learning Grant to facilitate the access of these

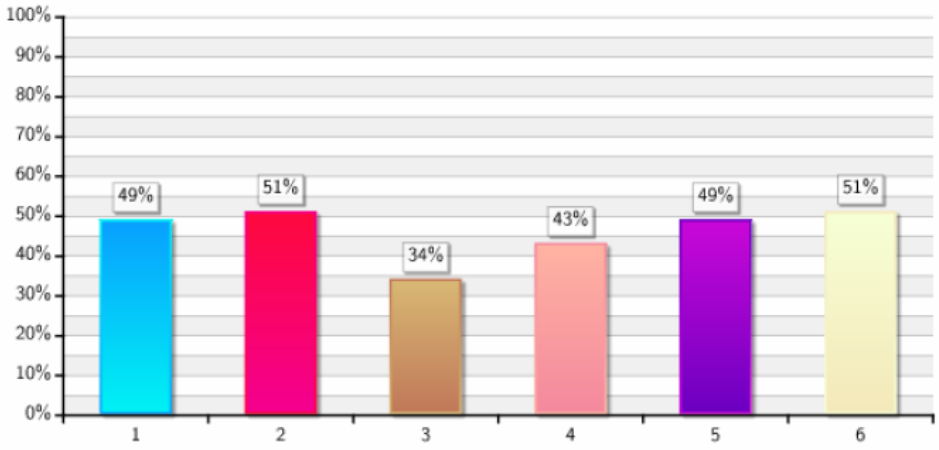
resources from home. During the course of the grant 69% of the teaching staff at the high school created one or more Moodle courses. Fully 98% of the teaching staff has accessed Moodle at some point during the course of the Grant.

One measure of progress on the Blended Learning Grant are student scores on the 21st Century Skills Test. In the grant pretest, HCHS students scored in the "Basic" range on the 21st Century Skills Assessment in fall of 2011; however, the teachers proctoring the post-test reported that students encountered some network delays that prevented them from accessing and taking the test. As a result only 341 of the 502 pre-test takers could access and complete the test. With 33% of the post-test takers eliminated from the score averages, the post-test was rendered an invalid measure of success in 21st Century skills for the first year of the Grant.

Along with the 21st Century Skills Assessment, an observation instrument was developed by the ETC to assess the use of technology in the classroom. The instrument is designed to measure a number of elements of effective technology integration in the classroom including collaborative learning opportunities, effective student questioning, and clear communication of expectations. From August 2011 to January 2012, forty-seven classroom observations were conducted. The table and chart below is a summary of the results of these observations:

Teacher: (Based on 47 walk-throughs)		
BL - Teacher:	**Selected**	**%**
1. Clearly communicates expectations for task / assignment	23	49%
2. Monitors and asks questions that reflect student ideas	24	51%
3. Connects work to daily element	16	34%
4. Summarizes steps of process or activity	20	43%
5. Provides feedback and guidance	23	49%
6. Blending technology within the lesson	24	51%

BL - Teacher: Selected



Since the implementation of the grant test AYP scores at the high school have made steady improvement. While several other programs were put into place in the high school during this time the ED2011 grant and blended learning project were two projects that had a significant impact on the school's culture. The table below shows the gains made in terms of Adequate Yearly Progress (AYP) for the academic years 2009, 2010, and 2011. This covers the period of time just before the grant was implemented, at the beginning of the grant period and at the end of the first year of the grant.

	2008-2009	2009-2010	2010-2011
English Language Arts	87.7%	74.9%	75%
Math	74.9%	74.9%	76%
Graduation Rate	75%	80%	85%

During the final year of the project a new testing system was implemented at the high school. Unfortunately, this means that AYP data for the final year of the grant is unavailable. In terms of the existing data, a trend towards improved student performance especially in the areas of math and graduation can be seen. The one exception to this trend was English Language Arts (ELA) where a significant drop in student performance can be seen between the year prior to the grant and the first year of the grants implementation. This area improved slightly between the start of implementation and the first year of implementation. As will be discussed later the use of technology has had the longest lasting effect in the area of ELA as reported by the students interviewed for this report and yet an initial analysis of the scores would indicate a disconnect between usage and AYP scores in this area.

In addition to the AYP scores the district has implemented the 21st century skills assessment as a part of a state-wide initiative to improve technology skills. The 21st

century skills assessment is a standardized test given nationally and measures students' performance in six areas. These areas are creativity and innovation, communication and collaboration, research and information fluency, critical thinking, digital citizenship, and technology operations. Overall the scores for students at Haralson High School are better than those for the district or significantly the state. The table below provides the average student score at the high school in each of the six areas, as well as the overall exam, and provides the corresponding district, state, and global scores.

Area	School	District	State	Global
Overall Exam	282	274	263	283
Creativity and Innovation	277	267	257	280
Communication and Collaboration	267	258	249	267
Research and Information Fluency	267	261	251	271
Critical Thinking, Problem Solving and Decision Making	268	262	249	268
Digital Citizenship	285	279	266	286
Technology Operations and Concepts	286	276	267	290

Students, on average, consistently scored above both the district and state in all of the test areas. When compared with the national average students at Haralson County High School compare very favorably with all of the students taking the assessment with a deviation of no more than four point from the global average in each of the areas. The areas where students compared most favorably with their peers were critical thinking and communication/collaboration. This last area is most significant as the purpose of the ED2011 grant was to promote online communications not only at school but at home as well.

In order to triangulate this data student interviews were conducted to triangulate this data and observational data collected by the chief technology officer. At least half of the interviewees indicated that they had absolutely no internet access at home and that the

ED2011 grant was critical to their having any type of access at home. This is consistent with the level of Internet access in the county where a narrow corridor (GA Highway 120 and US 78) has cable access but many pockets in the county do not. This, combined with a relatively low social-economic status (SES) means that many of the students do not have any access to the internet beyond the school day.

The advantages of having home internet access took many forms. Once student noted that he was better able to communicate with his teachers. In addition to easier access to his teachers he also noted that the access allowed the student to engage in more "private conversations" with their teachers which made for better feedback. Notably he stated that he did not thank that all students were using this form of communication to its fullest extent.

Other uses of the internet included access to a number of online tests including EOCT prep tests, and USA TestPrep. All of the students interviewed reported that they used Google Search extensively to do research at home. Other ways in which the internet was used at home was to post assignments on Moodle (a district sponsored Learning Management System), online chemistry calculators, and teacher developed lectures which could be accessed at home. This last use hints at some of the potential instructional uses of ubiquitous internet access including blended (combination of online and face to face instruction) and flipped learning (where a lecture is delivered at home and students do hands-on activities at school). Another advantage of having internet access at home as noted by one of the students was the ability to catch up when a day was missed due to illness.

In addition to instructional activities the internet access provided by the ED2011 grant also allowed students to engage in activities such as apply for college. One student also noted that other members of her family took advantage of the internet access to apply for a job.

The same student also noted that a problem with the netbooks was some inappropriate use of the netbooks. During the instructional day much of this inappropriate use centered on students going to various websites during a lecture (time off task). Data usage statistics indicate that some abuse took place by a small number of students outside of the instructional day. The vast majority of students were using, on average, 2 gig of data monthly. While approximately 5 students used over 10 gig of data. While the district does not have documentation this heavy usage in all probability was due to heavy, non-instructional multimedia usage. While filtering was used on all devices issued to the students much non-instructional, age appropriate, sites were not blocked and were probably accessed excessively.

One other theme that also emerged as a part of the interviews was the frustration with the filtering software that was used. In two cases student noted that sties that teachers had specifically recommended were blocked and all of the students indicated that a large number of sites that they were using during research activities were blocked. The issue of filtering and striking the appropriate balance between blocking inappropriate content and allowing access to appropriate instructional content is a constant challenge.

Data Usage

The average usage in March/April/May 2011 was 323 MB/per user.
The following table shows data usage at six discrete levels and the number of students using the respective data.

Users over 5GB	8	1.01%
Users over 2GB less Than 5GB	27	3.40%
Users over 1GB less Than 2GB	38	4.79%
Users over 100MB less Than 1GB	126	15.87%
Users over 0.1MB less Than 100MB	283	35.64%
Users with Zero Usage	312	39.29%

By contrast, the average usage in November2011/December2011/January 2012 was 1.57 GB/per user. The usage in year 2 is significantly higher mainly due to 66 users who are using more than 5GB and one user at 49GB.

The following table shows data usage at eight discrete levels and the number of students using the respective data.

Users over 20GB less than 50GB	6	0.54%
Users over 10GB less than 20GB	14	1.27%
Users over 5GB less than 10GB	46	4.16%
Users over 2GB less Than 5GB	133	12.04%
Users over 1GB less Than 2GB	228	20.63%
Users over 100MB less Than 1GB	441	39.91%
Users over 0.1MB less Than 100MB	60	5.43%
Users with Zero Usage	177	16.02%

The average usage in March/April/May 2011 was 1.57 GB/per user.
The following table shows data usage at eight discrete levels and the number of students using the respective data.

Users over 20GB less than 50GB	5	Less than 0%

Users over 10GB less Than 20GB	14	1%
Users over 5GB less than 10GB	47	4%
Users over 2GB less than 5GB	357	32%
Users over 1GB less than 2GB	148	13%
Users over 100MB less than 1GB	278	25%
Users less than 100MB	72	7%
Users with Zero Usage	176	16%

Project Costs

The Haralson County High School provides 1,108 students with wireless broad band connectivity as a result of this project. The cost per student is 38.01 which, when multiplied by the total number of students comes to 42,115.08 monthly or 505,380.96 annually. The current E-Rate discount for the Haralson County School district is 82% so that after the current E-Rate discount the school district will pay 90,968 annually to continue to support after school access for its high school students. At the time of the interim report it was anticipated that these costs could be paid using Title I funds. Current federal regulations will not allow for the use of funds to pay for student access to internet resources at home. As a result this program will have to suspended for the coming school year. The school district is seeking other funding sources to solve the problem of sustainability. The district has applied for a 10 million dollar race to the top grant and is working with local business and government agencies to form a

public/private consortium that will provide filtered, family-friendly, internet access to the students and library patrons of the county.

Effectiveness of Protective Measures

To insure utilization of appropriate safety measures to meet the requirements of the Children's Internet Protection Act (CIPA), the district servers have been equipped with a SonicWall E5500 firewall and a M86 Web filter. All netbooks are configured with a M86 Mobile Clients to ensure CIPA compliance with students are accessing the Internet while at home. Through these services, the Haralson County School District maintains the ability to filter the website requests of students and also monitor the traffic patterns of all users thus allowing for modification of the filter parameters as needed. To protect against waste, fraud, and abuse the district has issues parental consent forms detailing the objectives of the project, expectations for usage both in and out of school along with consequences for misuse and damage or loss of the mobile learning device. Parents also attended meetings at the Haralson County High School in which policies related to Internet usage, misuse, theft, and the consequences for violation of those policies were explained.

While the vast majority of the students used the devices for their intended purposes a few students were able to "hack" the netbooks to bypass the web filters or in extreme cases so that they became unusable. When this happened,

disciplinary measure were taken as per the policy explained to the parents and students when the netbooks were initially issued.

The district has also implemented a virtualization initiative in which each student will ultimately receive their own virtualized desktop which will be available through a thin client, tablet, or other computing device. As the netbooks become unusable due to obsolescence students will be issued a thin client. The district has also implemented a tablet management system called Air-Watch. This will allow the district to provided more robust content filtering along with the ability to better manage the devices when they are being used. This system along with the use of virtual desktops, and the implementation of a county wide wireless network should reduce the amount of abuse and technical support required to support the devices.

Lessons Learned

The unquestioned lesson learned in this project is the necessity of providing ubiquitous access to the internet in the district. First, the growing body of research in areas such as distance learning, blending learning, and flipped instruction demonstrate the necessity for our students to have increased 24/7 access to the district's digital resources. Secondly, with the seismic shift in IT resources to cloud based computing means that resources such as virtual desktops and more web 2.0 tools can be delivered to students who have access to

broadband internet connections at home. Thirdly, the data presented especially the testimonials for the students interviewed offer a glimpse into the future for those students who are able to have access to broadband connections at home. Unfortunately, as will be discussed, the costs associated with providing this level access to all students means that the digital divide for many of our low income, rural students will remain for short term. However, the district is taking these lessons and working diligently on systems that will allow it to provide this level of access to ALL of the students in the district, not just those who can afford it.

Problems implementing the project have primarily revolved around two areas, wireless access in the school and maintenance of the netbooks themselves. While there have been some problems with wireless access outside of the school, those issues have been minimal. During the grant period the more significant issue has been wireless access inside of the school. Due to the school's construction the district has had to create a wireless access infrastructure in the school and this has been problematic due to the unique nature of the educational environment which requires high availability of large amounts of bandwidth at one time. This along with the older radios in the netbooks which require 2.5 mhz transmitters have meant several "false starts" to implementing wireless in the high school. Recently the wireless engineers hired for the project solved the problems of older wireless technology and peak usage times. The solution has

been implemented in one building of the high school complex over Christmas break and recently the entire campus was upgraded to the new system.

The other significant issue which arose during the grant funding period has been the amount staff time necessary to maintain the netbooks funding through the blended learning grant. This is significant as it has had an impact on the amount of time that they staff could devote to other issues such as in-service training and the reliability of the devices. While intentional abuse has been minimal the netbooks used in this project have experienced a high number of equipment failures and so have required a great deal of maintenance to keep them operational. One of the district's technology staff has taken the lead on this effort and she works closely with the ETC as well as a group of students at the high school to help keep the equipment in working order. These efforts include re-imaging the devices, repairing broken screens, and replacing faulty equipment. The exponential increase in the number of devices has meant that the problems have increased proportionately and have meant increased staff time to maintain and support the devices.

To address these issues especially the issue of wireless access on site a testing/prototyping period should have been implemented to ensure that the netbooks and the wireless would work well together. If the project were being implemented at this time, the district would probably have elected to use tablets

with VMView clients installed on the tablets and implemented a robust remote management system thus allowing students full access to the resources of the district in a more controlled environment. Combined with the district's current virtualization project, the use of tablet computers would mean that the students would have all of the computing resources of the district available to them in a more controlled environment. Furthermore, as more tablets come to market the prices of tablets will continue to fall dramatically and more resources to manage tablet devices remotely would mean fewer resources would need to be spent on maintaining devices.

A second, and more significant, lesson learned from the project has been the costs associated with the project. The costs associated with providing each student with their own computing device along with unfettered wireless access outside of the school's physical plant are substantial. It was hoped that after the funding period was ended the district could use other funds such as Title I funds to continue to provide access to the students at home. Unfortunately, this project has proven to be the exception to the rule when it comes to allowing students ubiquitous internet access. E-rate regulations as well as other federal regulations discourage and even prohibit districts form funding initiatives such as the Ed2011 grant. As a result the district has had to suspend the broadband initiative associated with the program. The situation that this creates is one

where some students will be able to participate in the larger digital society while others cannot. The first consequence of this situation is obvious, and that is that the digital have-nots get further behind while the digital haves get ahead. But a second and underappreciated consequence of this inequity is that the digital have-nots also impede the progress of the digital haves. Because many of the newer instructional models assume that everyone has the same access to all digital resources valuable instructional time is wasted catching up the digital have-nots while the digital haves must wait.

It is the desire of the district to continue this project for the high school students as well as expand this project to all students in the district. This will allow a number of innovative instructional strategies to be used with students throughout the district as well as eliminate the barriers associated with the digital divide for the students in the district.

In order to do this a considerable investment will need to be spent on infrastructure and devices alone. As discussed preciously the annual costs associated with using commercial companies is, at this time, proving to be too much for the district. When the costs associated with providing data access plans at current market rates are added the costs associated with providing every student with ubiquitous access to a complete range of electronic resources becomes prohibitive. Yet, as the 21st Century continues to unfold it will be

imperative for all of our students to have full access to all of the electronic resources that they will need to be successful in school and in the new world economy. The model that Haralson County Schools intends to try to meet these needs is that of the Piedmont Alabama City schools where an investment was made in a wireless system for the entire community. Of course the challenge for Haralson will be the geographic area that must be covered. To cover this area will take an initial investment of at least 5 million dollars. Secondly, maintenance of the system will be a problem. To meet both of these challenges the district has applied for a race to the top grant a portion of which will fund this initiative. To maintain the system a consortium of public and private interests will be formed to manage the wireless system. This consortium will provide low-cost unfiltered internet to the community. This low-cost internet access will then pay for the maintenance costs associated with the free, filtered, internet provided to the students of the district. This is an ambitious plan and has a number of risks but the societal and economic costs to the district's students are too great for inactivity in this area.